MULTIMEDIA UNIVERSITY®

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 2, 2022/2023

HBC1021 – BIOCHEMISTRY II

6 JULY 2023
9:00 AM – 11:00 AM
(2 Hours)

INSTRUCTIONS TO STUDENTS

1. This paper consists of **3 pages** (including the front page)
2. This paper consists of **4 Short Answer Type questions**. All questions carry equal marks (10 marks per question).
3. Answer **ALL QUESTIONS.**
4. Print your answers **clearly** and **neatly** in the Answer Booklet provided

Question 1

A. List molecule that activates or inhibits citric acid cycle, ONE for each. [1 mark]

B. Most hunters know that meat from animals that have been run to death tastes sour. Suggest a reason for this observation. [1 mark]

C. List TWO metabolites that affect metabolic flux of the pentose phosphate pathway. [1 mark]

D. Describe briefly TWO biological roles of Cori cycle. [2 marks]

E. It has been observed that the mitochondria of muscle cells have more cristae than the mitochondria of liver cells. Provide a rationale for this observation. [1 mark]

F. The most common known enzyme defect in humans is glucose-6-phosphate dehydrogenase (G6PD) deficiency, an X-linked recessive disorder, which cause anemia. It has been shown that some mutations in G6PD deficiency are subject to strong selective advantage in Southeast Asia population since it confers protection against malaria disease. Suggest ONE possible mechanism for the protection against malaria. [1 mark]

G. How is ATP generated from oxidative phosphorylation? [1 mark]

H. Name TWO examples of reactive oxygen species. Why are they dangerous to cells? [2 marks]

Question 2

A. What is the functional difference between NADH and NADPH? [1 mark]

B. What is the benefit of performing controlled stepwise oxidation of sugar in a cell? [1 mark]

C. What is autophagy? What is the main difference between autophagy and ubiquitin-proteasome system? [2 marks]

D. What are inborn errors of metabolism? Give ONE example of disease due to inborn errors of metabolism. [1 mark]

E. High-protein and low-carbohydrate diets involving daily ingestion of large amounts of protein hydrolysate (a mixture of amino acids and small oligopeptides) can be dangerous, although body weight often decreases quickly. Explain why most of the rapid weight loss in a high-protein diet is due to water loss rather than increased rates of fatty acid oxidation. [2 marks]

F. List ONE regulatory mechanism that ensures a balanced pool of guanine and adenine in cells. [1 mark]

G. What is the difference between *de novo* and salvage nucleotide synthesis pathways? [2 marks]

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Question 3

A. What is photorespiration? What would be the effect on plants if photorespiration did not exist? [2 marks]

B. Describe the biochemical differences of mitochondria and chloroplasts. [1 mark]

C. List TWO major types of carbohydrates store in plant. [1 mark]

D. Give TWO reasons why triacylglycerols are extraordinarily efficient for energy storage. [2 marks]

E. People who consume little fat but excess carbohydrates can still become obese. How is this result possible? [1 mark]

F. Explain why people with a hereditary deficiency of carnitine acyltransferase II have muscle weakness. [1 mark]

G. How do bile salts help in the digestion of fats? [1 mark]

H. What is lipid raft? [1 mark]

Question 4

A. Describe TWO metabolic engineering strategy that can be used to improve the production of natural products. [2 marks]

B. Body mass index (BMI) has been routinely used to predict the health outcome of an individual. However, it may not be suitable for individuals with muscular body. Why? [1 mark]

C. Describe briefly TWO differences between type I and type II muscles. [2 marks]

D. List ONE common metabolic change observed in the tumor cells. [1 mark]

E. At only 2% of body mass, brain consumes at least 20% of the total energy demands of the body. Why does brain need so much energy? What is the alternative energy source for brain when the glucose supply become limited? [1.5 marks]

F. What is the common metabolite connecting pentose phosphate pathway and fatty acid synthesis? [0.5 mark]

G. Describe briefly the formation of diabetic ketoacidosis. [2 marks]

End of paper